

PURWANCHAL UNIVERSITY
I SEMESTER FINAL EXAMINATION-2003

LEVEL : B. E. (Civil)

SUBJECT: BEG104SH, Chemistry

TIME: 03:00 hrs

Full Marks: 80

Pass marks: 32

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt any FIVE questions, choosing at least TWO questions from GROUP-A and ONE from GROUP-B and C.

GROUP-A

Q. [2] [a] Explain the working of the galvanic cell by taking the example of Zn/CuSO_4 reaction. Also explain the function of a salt bridge. [10]

Q. [1] [a] What is buffer solution? Explain the action of buffer in addition of acid and base with examples. [2+6]

[b] What are electrolytic cell and galvanic cell? A galvanic cell consists of metallic zinc plate immersed in 0.1 M zinc nitrate solution and lead plate in 0.02M lead nitrate solution. Calculate the E.M.F of the cell at 25°C . Also write the cell notation. [2+6]

$E^\circ \text{Zn}^{2+}/\text{Zn} = -0.76\text{V}$, $E^\circ \text{Pb}^{2+}/\text{Pb} = -0.13\text{V}$.

Q. [2] [a] State Hess's law of constant heat transmission. Determine ΔH of the reaction $\text{C}_{(s)} + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_4(\text{g})$ from the following data. [6+6]

(i) $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) \Delta H = -393.7\text{KJ}$.

(ii) $\text{H}_2(\text{g}) + 1/2 \text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}) \Delta H = -285.7\text{kJ}$

(iii) CH_4

[b] Define internal energy and entropy of a reaction. [4]

Q. [3] Write short note on (any TWO): [2×8=16]

[a] Hybridization.

[b] Hund's rule

[c] Corrosion.

Q. [4] Derive de-Broglie equation. Calculate the de-broglie wave lengths associated with a ball of 200gm. Mass with a velocity of $3 \times 10^6 \text{ ms}^{-1}$ and an electron moving with the same velocity. [10+6]

GROUP-B

Q. [5] Give the postulate of valence theory. How it explains the formation of octahedral and tetrahedral complexes. [10+6]

Q. [6] What are transition elements? Give the electronic configuration of 3-d series. Explain the characteristic properties of transition element with regard to:

[a] Colour.

[b] Magnetic properties.

[c] Complex formation.

[d] Oxidation State. [4+4+4+4]

Q. [7] Write short note (any TWO): [2×8=16]

[a] Silicones.

[b] Water Pollution.

[c] Valence bond theory.

Q. [8] What are $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ reactions? Explain the mechanism of $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ reaction. [8+8]

Q. [9] What are enantiomers and diastereomers? Explain the optical isomerism in tartaric acid. [8+8]

Q. [10] What are natural and synthetic rubbers? Give the preparation, properties and uses of Teflon, nylon 6,6, and polystyrene. [8=8]

PURWANCHAL UNIVERSITY

I SEMESTER FINAL EXAMINATION-2004

LEVEL : B. E. (Civil)

SUBJECT: BEG104SH, Chemistry

TIME: 03:00 hrs

Full Marks: 80

Pass marks:

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt any FIVE questions, choosing at least TWO questions from GROUP-A and ONE from GROUP-B and C.

GROUP-A

Q. [1] [a] Derive de-Broglie equation for a particle of mass m moving with a velocity c . [10]

[b] Calculate the wavelength of an a particle having mass 6.6×10^{-27} kg moving with a speed of 10^5 cm/sec ($h = 6.6 \times 10^{-34}$ sec). [6]

Q. [2] [a] Explain the working of the galvanic cell by taking the example of $Zn/CuSO_4$ reaction. Also explain the function of a salt bridge. [10]

[b] Calculate the E° of the cell; $Cu + 2Ag^+(aq) \rightarrow Cu^{2+} + 2Ag(s)$. When $[Cu^{2+}] = 0.130M$ and $[Ag^+] = 1 \times 10^{-2} M$. The value $E^\circ_{Cu^{2+}/Cu}$ and $E^\circ_{Ag^+/Ag}$ are given to be 0.34V and 0.8V respectively. [6]

Q. [3] State and explain Hess's law of constant heat summation. What are their applications? [2+8+6]

Q. [4] Write notes on (any TWO): [2*8=16]

[a] Buffer Solution

[b] Hydrogen Electrode

[c] Common ion Effect

GROUP-B

Q. [5] Differentiate between double salt and complex salt. Explain giving Werner's postulates, the bonding in coordinate compounds. [4+12]

Q. [6] What is hybridization? Explain the shape of PCl_5 molecule on the basis of hybridization. PCl_5 molecule is highly reactive, why? [4+8+4]

Q. [7] Write notes on (any TWO): [2*8=16]

[a] Water Pollution

[b] Silicones

[c] Applications of coordinate complexes

GROUP-C

Q. [8] Write down the preparation, properties and uses of Grignard reagent. [16]

Q. [9] [a] What is Stereoisomerism? Write three criteria for the compound to exhibit stereoisomerism. [2+6]

[b] Differentiate between optical and geometrical isomerism. [8]

Q. [10] Write notes on (any TWO): [2*8=16]

[a] T.N.G.

[b] Polymerization

[c] Substitution Reaction

PURWANCHAL UNIVERSITY

I SEMESTER BACK-PAPER EXAMINATION-2005

LEVEL : B. E. (Civil)

SUBJECT: BEG104SH, Chemistry

TIME: 03:00 hrs

Full Marks: 80

Pass marks:

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt any FIVE questions, choosing at least TWO questions from GROUP-A and ONE from GROUP-B and C.

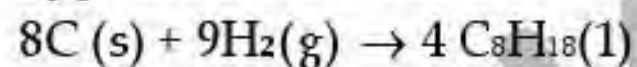
GROUP-A

Q. [1] [a] What is buffer solution? Explain the action of buffer in addition of acid and base with examples. [2+6]

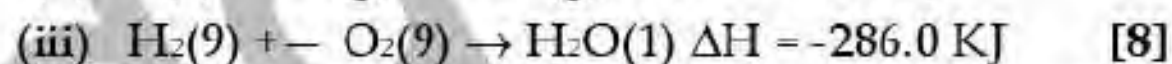
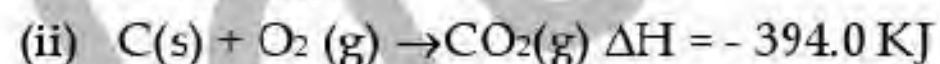
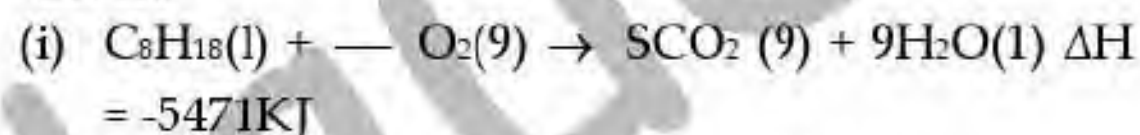
[b] Find the pH of 0.002 M acetic acid solution if it is 3.2% ionized at this dilution.

Q. [2] [a] State and explain law of Thermodynamics. [8]

[b] Calculate the enthalpy change for the following hypothetical reaction.



Given:



Q. [a] What are quantum numbers? State their significances. Calculate the permitted values of n , l and m for 2p_z orbital. [8]

[b] What do you mean by wave particle duality of matter & radiation? Calculate the de-broglie wave

length of a particle of mass 1 gm moving with a velocity 2000 m s^{-1} [2+4+2]

Q. [4] Write notes on (any TWO): [2 x 8 = 16]

[a] Calorific values of food & fuels.

[b] Corrosion and its prevention.

[c] Electrovalency and co-ordinate covalency.

Group-B

Q. [5] [a] What are co-ordination compounds? Write the main applications of co-ordination compound. [2+6]

[b] Write the basic postulates of VBT. Explain the geometry and magnetic properties of $[\text{CoF}_6]^{3-}$ ion on the basis of VBT. [4+4]

Q. [6] [a] What are transition elements? Discuss their characteristics with reference to (i) Electronic configuration (ii) Oxidation states. [2+3+3]

[b] What do you mean by Para magnetism and diamagnetism? Why the Para magnetism in transition elements first increases gets to maximum near the middle of the series and then decreases. [3+3+2]

Q. [7] Write notes on (any TWO): [2 x 8 = 16]

[a] Double salt and complex salt

[b] Soil pollution

[c] Organo silicon polymer.

GROUP-C

Q. [8] [a] What are carbonium ion & carbanion? Give structure, stability and reactivity of carbanions carbonium ion.

[b] Explain the Mechanism of $\text{S}_\text{N}1$ and $\text{S}_\text{N}2$ reaction with suitable examples. [4]

Q. [9] [a] What are stereoisomers? Differentiate enantiomers and Diastereomers with suitable examples.

[b] What are Grignard reagents? How would you prepare different classes of alcohols, carboxylic acids and alkenes?

Q [10] Write notes on (any TWQ). [2×8]

[a] Racemic Modification

[b] Explosives

[c] Rearrangement reaction

PURWANCHAL UNIVERSITY
I SEMESTER FINAL EXAMINATION-2007

LEVEL : B. E. (Civil)

SUBJECT: BEG104SH, Chemistry

TIME: 03:00 hrs

Full Marks: 80

Pass marks:

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt any FIVE questions, choosing at least TWO questions from GROUP-A and ONE from GROUP-B and c.

GROUP-A

Q. [1] [a] What are quantum numbers? State the significance of the four quantum numbers. [8]

[b] What do you understand by the dual character of matter? Derive de- Broglie equation. A particle having wavelength 6.6×10^{-4} cm is moving with the velocity of 10^6 sec^{-1} . Find the mass of the particle ($h = 6.62 \times 10^{-27} \text{ erg sec}$) [2+3+3]

Q. [2] [a] What type of bond is formed in calcium oxide molecule? Explain the formation of bond and the characteristics of it. [8]

[b] Explain sp , sp^2 , sp^3 hybridisation with the help of organic molecules. Indicate the shape of the molecule in each case. [8]

Q. [3] [a] Derive Ostwald's dilution law and point out its limitations. Calculate the pH of 0.1 M solution of acetic acid (K_a for acetic acid $= 1.8 \times 10^{-5}$)

[b] What is electrochemical series? What information can be derived from it? [5+3]

Q. [4] [a] Define internal energy and enthalpy. Show that the change in enthalpy at constant pressure for a reaction involving gases is given by the expression $\Delta H = \Delta E + \Delta nRT$? [2+2+4]

[b] Define molar heat capacity at constant volume (C_v) and at constant pressure (C_p). Derive Kirchhoff's equation. [2+6]

GROUP-B

Q. [5] [a] Describe Werner's Theory of coordination compounds, name the following compounds per IUPAC rules

[i] $[\text{Zn}(\text{OH})_4]^{2-}$ [ii] $[\text{Fe}(\text{CN})_6]$
[iii] $\text{K}_2[\text{Pt} \cdot \text{Cl}_5]$ [iv] $[\text{Cu}(\text{NH}_3)_4]^{2+}$ [4+4]

[b] $[\text{Ni}(\text{CN})_4]^{2-}$ ion has a square planar geometry and $\text{Ni}(\text{CO})_4$ has tetrahedral geometry. Explain this on the basis of valence bond theory and discuss their magnetic behavior. [3+3+2]

Q. [6] Describe the general characteristics of transition elements with special reference to the following. [16]

- [a] Variable oxidation states
- [b] Formation of color compounds
- [c] Complex formation
- [d] Magnetic behavior
- [e] Good catalysts

Q. [7] Write notes on (any TWO): [8+8=16]

- [a] Double salt and complex salt
- [b] Chemistry of silicon
- [c] Air pollution and its remedies

GROUP-C

Q. [8] What do you understand by the terms SN^1 and SN^2 reactions? Explain the types of substitution elimination reactions with suitable examples.

Q. [9] What is meant by stereoisomerism? How many stereoisomerism are known? Explain each with examples. [2+2+6]

Q. [10] Write notes on (any TWO): [8+8=1]

[a] Chemistry of TNT and nitrocellulose

[b] Teflon & Terylene

[c] Preparation and uses of Grignard reagents

PURWANCHAL UNIVERSITY
I SEMESTER CHANCE EXAMINATION-2009

LEVEL : B. E. (Civil)

SUBJECT: BEG104SH, Chemistry

TIME: 03:00 hrs

Full Marks: 80

Pass marks:

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt any FIVE questions, choosing at least TWO questions from GROUP-A and ONE from GROUP-B and c.

GROUP-A

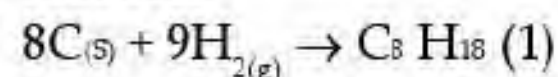
Q. [1] [a] What are quantum numbers? State the significance of the four quantum numbers. [8]

Q. [1] [a] What do you understand by wave particle duality of matter and radiation? Derive de-Broglie's equation. Calculate the de-Broglie's wavelength associated with a ball of 200gm mass moving with a velocity of $3 \times 10^6 \text{ ms}^{-1}$. [2+3+3]

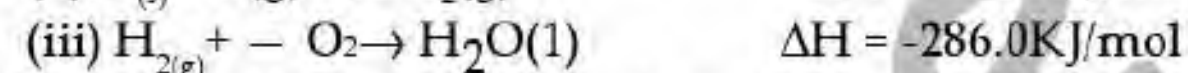
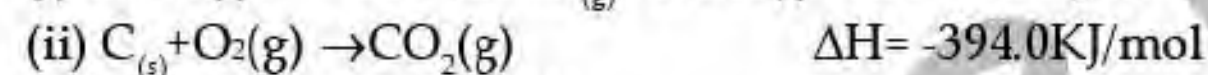
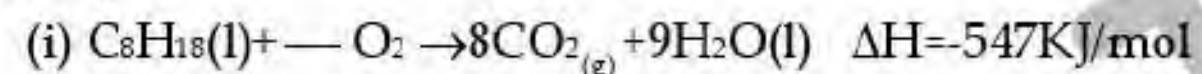
[b] What are quantum numbers? What is the significance of quantum numbers? Calculate the permitted values of n, l, m and s for $3d^1$ electron. [2+3+3]

Q. 2 [a] What is enthalpy? Derive the relationship between ΔH and ΔE . In what condition $\Delta H = \Delta E$? [2+4+2]

[b] Derive the Kirchhoff's equation. Calculate the enthalpy change for following hypothetical reaction. [4+4]



Given,



Q. [a] what is buffer solution? explain the action of buffer in addition of acid and base with examples. [2+6]

Q. [8] [a]

Q.

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